A P P E N D I X A

Appendix A: Model Default Scenario Parameter Values for a Lane and Front-end Model

A.1 LaneM2 Default Scenario Parameters

Parameter	Value	Range	Description
Time length of scenario	60	0.0 to 1440.0 (minutes)	Length of the simulation scenario in minutes
Number of baggers	1	0, 1, or 2	Number of baggers; options are 0 baggers, 1 bagger for both lanes, or 2 baggers - one for each lane
Maximum number of items on front belt	20	1 to 200	Maximum number of items on front belt
Maximum number of items in bagging area	20	1 to 200	Maximum number of items on back belt and bagging area
Probability of basket icon	0.5	0.0 to 1.0	Probability a customer uses a basket (vs. cart) when their basket size is less than 15 items (animation only)
Unlimited arrivals option identifier	0	0 or 1	Enter 0 to represent customer arrival process OR 1 to represent unlimited number of customers
Constant inter-arrival option identifier	0	0 or 1	Enter 0 to represent a random customer arrival process OR 1 to represent a constant time between arrivals
Customer arrival rate	20	1.0 to 200.0 (customers per hour)	Expected number of customer arrivals per hour
Average basket size parameter for lane 1	15	1 to 100	Average basket size for customer at lane 1
Average basket size parameter for lane 2	15	1 to 100	Average basket size for customer at lane 2
Unload item time parameter 1 for lane 1	3	0.0 to 30.0 (seconds)	Unload time per item parameter 1 (e.g. average) in seconds for lane 1
Unload item time parameter 2 for lane 1	1	0.0 to 30.0 (seconds)	Unload time per item parameter 2 (e.g. standard deviation) in seconds for lane 1
Unload item time parameter 1 for lane 2	3	0.0 to 30.0 (seconds)	Unload time per item parameter 1 (e.g. average) in seconds for lane 2
Unload item time parameter 2 for lane 2	1	0.0 to 30.0 (seconds)	Unload time per item parameter 1 (e.g. standard deviation) in seconds for lane 2
Enter scan and bag rule for lane 1	0	0 or 1	Enter 0 if cashier cannot switch to Enter-bag mode OR 1 if cashier can for lane 1
Enter scan and bag rule for lane 2	0	0 or 1	Enter 0 if cashier cannot switch to Enter-bag mode OR 1 if cashier can for lane 2
Probability of reading a scanned item per pass for lane 1	0.95	0.0 to 1.0	Probability that a scanned item is read (or recorded) per pass for lane 1
Probability of scanning an item for lane 1	0.87	0.0 to 1.0	Probability that an item is scanned in lane 1, Note: ProbScanL1+ProbScanKeyL1+ProbWeighKeyL1=1.0
Probability of keying an item for lane 1	0.03	0.0 to 1.0	Probability that an item is keyed in lane 1, Note: ProbScanL1+ProbScanKeyL1+ProbWeighKeyL1=1.0

Probability of weighing and keying an item for lane 1	0.1	0.0 to 1.0	Probability that an item is weighed & keyed in lane 1, NOTE: ProbScanL1+ProbScanKeyL1+ProbWeighKeyL1=1.0
Scan time parameter 1 for lane 1	3.5	0.0 to 30.0 (seconds)	Scan time per item parameter 1 (e.g., average time) in seconds for lane 1
Key time parameter 1 for lane 1	6.5	0.0 to 30.0 (seconds)	Key time per item parameter 1 (e.g., average time) in seconds for lane 1
Weigh and key time parameter 1 for lane 1	9.2	0.0 to 30.0 (seconds)	Weigh and Key time per item parameter 1 (e.g., average time) in seconds for lane 1
Scan time parameter 2 for lane 1	1	0.0 to 30.0 (seconds)	Scan time per item parameter 2 (e.g., standard deviation) in seconds for lane 1
Key time parameter 2 for lane 1	2	0.0 to 30.0 (seconds)	Key time per item parameter 2 (e.g., standard deviation) in seconds for lane 1
Weigh and key time parameter 2 for lane 1	3	0.0 to 30.0 (seconds)	Weigh and Key time per item parameter 2 (e.g., standard deviation) in seconds for lane 1
Probability of an enter-item resolution event for lane 1	0.005	0.0 to 1.0	Probability of an Enter Item Resolution event lane 1
Enter item resolution time parameter 1 for lane 1	3	0.0 to 60.0 (seconds)	Enter Item Resolution time parameter 1 (e.g., average time) in seconds for lane 1 for each occurrence
Enter item resolution time parameter 2 for lane 1	1	0.0 to 60.0 (seconds)	Enter Item Resolution time parameter 2 (e.g., standard deviation) in seconds for lane 1 for each occurrence
Probability of reading a scanned item per pass for lane 2	0.95	0.0 to 1.0	Probability that a scanned item is read (or recorded) per pass for lane 2
Probability of scanning an item for lane 2	0.87	0.0 to 1.0	Probability that an item is scanned in lane 2, NOTE: ProbScanL2+ProbScanKeyL2+ProbWeighKeyL2=1.0
Probability of keying an item for lane 2	0.03	0.0 to 1.0	Probability that an item is keyed in lane 2, NOTE: ProbScanL2+ProbScanKeyL2+ProbWeighKeyL2=1.0
Probability of weighing and keying an item for lane 2	0.1	0.0 to 1.0	Probability that an item is weighed & keyed in lane 2, NOTE: ProbScanL2+ProbScanKeyL2+ProbWeighKeyL2=1.0
Scan time parameter 1 for lane 2	3.5	0.0 to 30.0 (seconds)	Scan time per item parameter 1 (e.g., average time) in seconds for lane 2
Key time parameter 1 for lane 2	6.5	0.0 to 30.0 (seconds)	Key time per item parameter 1 (e.g., average time) in seconds for lane 2
Weigh and key time parameter 1 for lane 2	9.3	0.0 to 30.0 (seconds)	Weigh and Key time per item parameter 1 (e.g., average time) in seconds for lane 2
Scan time parameter 2 for lane 2	1	0.0 to 30.0 (seconds)	Scan time per item parameter 2 (e.g., standard deviation) in seconds for lane 2
Key time parameter 2 for lane 2	2	0.0 to 30.0 (seconds)	Key time per item parameter 2 (e.g., standard deviation) in seconds for lane 2
Weigh and key time parameter 2 for lane 2	3	0.0 to 30.0 (seconds)	Weigh and Key time per item parameter 2 (e.g., standard deviation) in seconds for lane 2
Probability of an enter-item resolution event for lane 2	0.005	0.0 to 1.0	Probability of an Enter Item Resolution event for lane 2
Enter item resolution time parameter 1 for lane 2	3	0.0 to 60.0 (seconds)	Enter Item Resolution time parameter 1 (e.g., average time) in seconds for lane 2 for each occurrence
Enter item resolution time parameter 2 for lane 2	1	0.0 to 60.0 (seconds)	Enter Item Resolution time parameter 2 (e.g., standard deviation) in seconds for lane 2 for each occurrence
Probability of a cash tender transaction for lane 1	0.242	0.0 to 1.0	Probability of a Cash Tender transaction for lane 1, NOTE: Tender Probabilities must sum to 1.0
Probability of a cheque tender transaction for lane 1	0.471	0.0 to 1.0	Probability of a Cheque Tender transaction for lane 1, NOTE: Tender Probabilities must sum to 1.0
Probability of a credit tender transaction for lane 1	0.204	0.0 to 1.0	Probability of a Credit Tender transaction for lane 1, NOTE: Tender Probabilities must sum to 1.0
Probability of a debit tender transaction for lane 1	0.066	0.0 to 1.0	Probability of a Debit Tender transaction for lane 1, NOTE: Tender Probabilities must sum to 1.0

Probability of an other tender transaction for lane 1	0.017	0.0 to 1.0	Probability of an Other Tender transaction, e.g., gift certificates, food stamps, etc. for lane 1
Cash tender time parameter 1 for lane 1	28	0.0 to 180.0 (seconds)	Cash tender time parameter 1 (e.g., average time) per transaction in seconds for lane 1
Cheque tender time parameter 1 for lane 1	58	0.0 to 180.0 (seconds)	Cheque tender time parameter 1 (e.g., average time) per transaction in seconds for lane 1
Credit tender time parameter 1 for lane 1	50	0.0 to 180.0 (seconds)	Credit tender time parameter 1 (e.g., average time) per transaction in seconds for lane 1
Debit tender time parameter 1 for lane 1	44	0.0 to 180.0 (seconds)	Debit tender time parameter 1 (e.g., average time) per transaction in seconds for lane 1
Other tender time parameter 1 for lane 1	30	0.0 to 180.0 (seconds)	Other tender time parameter 1 (e.g., average time) per transaction in seconds for lane 1
Cash tender time parameter 2 for lane 1	14	0.0 to 180.0 (seconds)	Cash tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 1
Cheque tender time parameter 2 for lane 1	29	0.0 to 180.0 (seconds)	Cheque tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 1
Credit tender time parameter 2 for lane 1	25	0.0 to 180.0 (seconds)	Credit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 1
Debit tender time parameter 2 for lane 1	22	0.0 to 180.0 (seconds)	Debit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 1
Other tender time parameter 2 for lane 1	15	0.0 to 180.0 (seconds)	Other tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 1
Probability of electronic rewards card event for lane 2	0.1	0.0 to 1.0	Probability of Electronic Rewards Card activity after tender per transaction for lane 1, Note: Prob. Electronic + Prob. Manual <=1.0
Electronic rewards card event time parameter 1 for lane 1	20	0.0 to 180.0 (seconds)	Electronic Rewards Card activity time parameter 1 (e.g., average time) in seconds for lane 1
Electronic rewards card event time parameter 2 for lane 1	10	0.0 to 180.0 (seconds)	Electronic Rewards Card activity time parameter 2 (e.g., standard deviation) in seconds for lane 1
Probability of manual rewards card event for lane 2	0.1	0.0 to 1.0	Probability of Manual Rewards Card activity after tender per transaction for lane 1, Note: Prob. Electronic + Prob. Manual <=1.0
Manual rewards card event time parameter 1 for lane 1	20	0.0 to 180.0 (seconds)	Manual Rewards Card activity time parameter 1 (e.g., average time) in seconds for lane 1
Manual rewards card event time parameter 2 for lane 1	10	0.0 to 180.0 (seconds)	Manual Rewards Card activity time parameter 2 (e.g., standard deviation) in seconds for lane 1
Probability of a tender resolution event for lane 1	0.1	0.0 to 1.0	Probability of a Tender Resolution event per transaction for lane 1
Tender resolution time parameter 1 for lane 1	30	0.0 to 180.0 (seconds)	Tender Resolution time parameter 1 (e.g., average time) in seconds for lane 1
Tender resolution time parameter 2 for lane 1	10	0.0 to 180.0 (seconds)	Tender Resolution time parameter 2 (e.g., standard deviation) in seconds for lane 1
Probability of a cash tender transaction for lane 2	0.242	0.0 to 1.0	Probability of a Cash Tender transaction for lane 2, NOTE: Tender probabilities must sum to 1.0
Probability of a cheque tender transaction for lane 2	0.471	0.0 to 1.0	Probability of a Cheque Tender transaction for lane 2, NOTE: Tender probabilities must sum to 1.0
Probability of a credit tender transaction for lane 2	0.204	0.0 to 1.0	Probability of a Credit Tender transaction for lane 2, NOTE: Tender probabilities must sum to 1.0
Probability of a debit tender transaction for lane 2	0.066	0.0 to 1.0	Probability of a Debit Tender transaction for lane 2, NOTE: Tender probabilities must sum to 1.0
Probability of an other tender transaction for lane 2	0.017	0.0 to 1.0	Probability of an Other Tender transaction, e.g., gift certificates, food stamps, etc. for lane 2
Cash tender time parameter 1 for lane 2	28	0.0 to 180.0 (seconds)	Cash tender time parameter 1 (e.g., average time) per transaction in seconds for lane 2
Cheque tender time parameter 1 for lane 2	58	0.0 to 180.0 (seconds)	Cheque tender time parameter 1 (e.g., average time) per transaction in seconds for lane 2

Credit tender time parameter 1 for lane 2	50	0.0 to 180.0 (seconds)	Credit tender time parameter 1 (e.g., average time) per transaction in seconds for lane 2
Debit tender time parameter 1 for lane 2	44	0.0 to 180.0 (seconds)	Debit tender time parameter 1 (e.g., average time) per transaction in seconds for lane 2
Other tender time parameter 1 for lane 2	30	0.0 to 180.0 (seconds)	Other tender time parameter 1 (e.g., average time) per transaction in seconds for lane 2
Cash tender time parameter 2 for lane 2	14	0.0 to 180.0 (seconds)	Cash tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 2
Cheque tender time parameter 2 for lane 2	29	0.0 to 180.0 (seconds)	Cheque tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 2
Credit tender time parameter 2 for lane 2	25	0.0 to 180.0 (seconds)	Credit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 2
Debit tender time parameter 2 for lane 2	22	0.0 to 180.0 (seconds)	Debit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 2
Other tender time parameter 2 for lane 2	15	0.0 to 180.0 (seconds)	Other tender time parameter 2 (e.g., standard deviation) per transaction in seconds for lane 2
Probability of electronic rewards card event for lane 2	0.1	0.0 to 1.0	Probability of an Electronic Rewards Card activity after tender per transaction for lane 2. Note: Prob. Electronic + Prob. Manual <=1.0
Electronic rewards card time parameter 1 for lane 2	20	0.0 to 180.0 (seconds)	Electronic Rewards Card activity time parameter 1 (e.g., average time) in seconds for lane 2
Electronic rewards card time parameter 2 for lane 2	10	0.0 to 180.0 (seconds)	Electronic Rewards Card activity time parameter 2 (e.g., standard deviation) in seconds for lane 2
Probability of manual rewards card event for lane 2	0.1	0.0 to 1.0	Probability of a Manual Rewards Card activity after tender per transaction for lane 2. Note: Prob. Electronic + Prob. Manual <=1.0
Manual rewards card time parameter 1 for lane 2	20	0.0 to 180.0 (seconds)	Manual Rewards Card activity time parameter 1 (e.g., average time) in seconds for lane 2
Manual rewards card time parameter 2 for lane 2	10	0.0 to 180.0 (seconds)	Manual Rewards Card activity time parameter 2 (e.g., standard deviation) in seconds for lane 2
Probability of a tender resolution event for lane 2	0.1	0.0 to 1.0	Probability of a Tender Resolution event per transaction for lane 2
Tender resolution time parameter 1 for lane 2	30	0.0 to 180.0 (seconds)	Tender Resolution time parameter 1 (e.g., average time) in seconds for lane 2
Tender resolution time parameter 2 for lane 2	10	0.0 to 180.0 (seconds)	Tender Resolution time parameter 2 (e.g., standard deviation) in seconds for lane 2
Bag time parameter 1 for lane 1	2.5	0.0 to 180.0 (seconds)	Bag time per item parameter 1 (e.g., average time) in seconds for lane 1
Bag time parameter 2 for lane 1	1	0.0 to 180.0 (seconds)	Bag time per item parameter 2 (e.g., standard deviation) in seconds for lane 1
Bag time parameter 1 for lane 2	2.5	0.0 to 30.0 (seconds)	Bag time per item parameter 1 (e.g., average time) in seconds for lane 2
Bag time parameter 2 for lane 2	1	0.0 to 30.0 (seconds)	Bag time per item parameter 2 (e.g., standard deviation) in seconds for lane 2
Customer bag rule for lane 1	0	0 or 1	Enter 0 if customer does NOT help bag items OR 1 if customer helps bag items for lane 1
Cashier bag rule for lane 1	0	0 or 1	Enter 0 if cashier does NOT help bag items OR 1 if cashier helps bag items for lane 1
Customer bag rule for lane 2	0	0 or 1	Enter 0 if customer does NOT help bag items OR 1 if customer helps bag items for lane 2
Cashier bag rule for lane 2	0	0 or 1	Enter 0 if cashier does NOT help bag items OR 1 if cashier helps bag items for lane 2
Number of replications	50	1 to 200	Number of simulation replications (e.g. Number of days)
Stream number identifier	1	1 to 10	Random number stream identifier

Check input option identifier	1	0 or 1	Enter 0 to Not write input parameter values to SSLChk.out OR 1 to write input parameter values to SSLChk.out

A.2 Front-end Model Default Scenario Parameters

Parameter	Value	Range	Description
Start time of the simulation scenario (hours)	6	0 to 24 (hours)	Start time of the simulation scenario in hour from midnight. Start time must be less than End time.
End time of the simulation scenario (hours)	23	0 to 24 (hours)	End time of the simulation scenario in hours from midnight. End time must be greater than Start time.
Number of Fast-Track lanes	1	0 to 47	Number of Fast-Track lanes at the front-end. The total number of all lanes (Fast-Track+Express+Regular) cannot exceed 48.
Number of Express lanes	3	0 to 47	Number of Express lanes at the front-end. The total number of all lanes (Fast-Track+Express+Regular) cannot exceed 48.
Number of Regular lanes	13	1 to 48	Number of Regular lanes at the front-end. Must be at least 1 Regular lane. The total number of all lanes (Fast-Track+Express+Regular) cannot exceed 48.
Probability of a Fast-Track customer	0.1	0 to 1.0	The probability that an arriving customer will use a Fast-Track lane.
Basket size limit for Express lanes	12	1 to 25	Basket size limit for Express lanes. Customers with larger basket sizes cannot use an Express lane.
Queue size criteria to open a new (overflow) lane	3	1 to 10	Queue size criteria to open a new (overflow) lane. An overflow lane is one that was not scheduled to be open and is operated by Overflow personnel.
Minimum time an overflow lane stays open	60	0 to 300 (seconds)	Minimum time (in seconds) that an overflow lane stays open. This parameter allows the user to avoid opening and closing an overflow too fast.
Maximum number of overflow lanes to open at one time	2	0 to 48	Maximum number of overflow lanes to open each time the front-end is scanned. The number of overflow lanes is also restricted by number of Overflow personnel.
Time of the first scan of front-end queue status after the scenario start time	0.5	0 to 24 (hours)	The time of the first scan (in hours from the start of the simulation scenario) to check front-end queue status. The User can set this parameter to End Time to shut-off the scan logic.
Time interval between scans of the front-end queue status	0.5	0 to 24 (hours)	The time interval (in hours) between scans of the front-end queue status. Set parameter value to zero for continuous scanning.
Minimum time for a customer to enter a lane	5	0 to 300 (seconds)	Minimum time (in seconds) for a customer to enter a lane upon arriving at the front-end.
Most likely time for a customer to enter a lane	10	0 to 300 (seconds)	Most likely time (in seconds) for a customer to enter a lane upon arriving at the front-end.
Maximum time for a customer to enter lane	15	0 to 300 (seconds)	Maximum time (in seconds) for a customer to enter a lane upon arriving at the front-end.
Minimum time from lane to exit	5	0 to 300 (seconds)	Minimum time (in seconds) for a customer to exit the store after completing their transaction at a lane.
Most likely time from lane to exit	10	0 to 300 (seconds)	Most likely time (in seconds) for a customer to exit the store after completing their transaction at a lane.
Maximum time from lane to exit	15	0 to 300 (seconds)	Maximum time (in seconds) for a customer to exit the store after completing their transaction at a lane.
Expected number of customer arrivals per time interval	ARRAY	N/A	Expected number of customer arrivals (per hour) in 15-minute intervals during the scenario. The model uses these values to randomly generate customer arrivals.
Multiplication factor to increase or decrease arrivals	1.0	0.01 to 5.0	Constant multiplication factor for each element of the customer arrival parameter above. A value less (greater) than 1.0 reduces (increases) the number of expected arrivals per time interval.
Average basket size per customer per time interval	ARRAY	N/A	Average basket size per customer in 15-minute intervals during the scenario. The model uses these values to randomly generate customer basket sizes.

Probability a customer uses a basket for 10 items or less	1.0	0 to 1.0	Probability that a customer uses a basket (vs. cart) when they have 10 items or less. The model uses this for animation purposes only.
Schedule of cashiers to operate Regular lanes	ARRAY	N/A	Schedule of cashiers to operate Regular lanes in half hour increments during the scenario. There must be at least 1 Regular lane open during a scenario.
Schedule of cashiers to operate Express lanes	ARRAY	N/A	Schedule of cashiers to operate Express lanes in half hour increments during the scenario.
Schedule of cashiers to operate Fast-Track lanes	ARRAY	N/A	Schedule of cashiers to operate Fast-Track lanes in half hour increments during the scenario.
Schedule of super helpers available to assist at a lane	ARRAY	N/A	Schedule of super helpers available to respond to intervention requests or to bag when a bagger is not available.
Number of super helpers dedicated for intervention only	1	0, 1, 2, or 3	Number of super helpers dedicated to servicing intervention requests (and therefore unavailable to perform bagging duties)
Number of overflow lane personnel	5	0 to 48	This is the number of staff available to open an unscheduled (not operated by a scheduled cashier) or overflow lane due to front-end congestion.
Schedule of Baggers or Courtesy Clerks	ARRAY	N/A	The number of Bagger/Courtesy Clerk resources in half-hour increments during the scenario.
Unload items event parameter 1 - Fast-Track lanes	10	0 to 300 (seconds)	Unload time per transaction parameter 1 (e.g., average time) in seconds for Fast-Track lanes. This event represents an unload delay when a customer enters an idle lane.
Unload items event parameter 2 - Fast-Track lanes	5	0 to 300 (seconds)	Unload time per transaction parameter 2 (e.g., standard deviation) in seconds for Fast-Track lanes. This event represents an unload delay when a customer enters an idle lane.
Unload items event parameter 1 - Express lanes	10	0 to 300 (seconds)	Unload time per transaction parameter 1 (e.g., average time) in seconds for Express lanes. This event represents an unload delay when a customer enters an idle lane.
Unload items event parameter 2 - Express lanes	5	0 to 300 (seconds)	Unload time per transaction parameter 2 (e.g., standard deviation) in seconds for Express lanes. This event represents an unload delay when a customer enters an idle lane.
Unload items event parameter 1 - Regular lanes	10	0 to 300 (seconds)	Unload time per transaction parameter 1 (e.g., average time) in seconds for Regular lanes. This event represents an unload delay when a customer enters an idle lane.
Unload items event parameter 2 - Regular lanes	5	0 to 300 (seconds)	Unload time per transaction parameter 2 (e.g., standard deviation) in seconds for Regular lanes. This event represents an unload delay when a customer enters an idle lane.
Enter item time parameter 1 - Fast-Track lanes	2.5	0 to 300 (seconds)	Enter item time per item parameter 1 (e.g., average time) in seconds for Fast-Track lanes.
Enter item time parameter 2 - Fast-Track lanes	1	0 to 300 (seconds)	Enter item time per item parameter 2 (e.g., standard deviation) in seconds for Fast-Track lanes.
Enter item time parameter 1 - Express lanes	2.5	0 to 300 (seconds)	Enter item time per item parameter 1 (e.g., average time) in seconds for Express lanes.
Enter item time parameter 2 - Express lanes	1	0 to 300 (seconds)	Enter item time per item parameter 2 (e.g., standard deviation) in seconds for Express lanes.
Enter item time parameter 1 - Regular lanes	2.5	0 to 300 (seconds)	Enter item time per item parameter 1 (e.g., average time) in seconds for Regular lanes.
Enter item time parameter 2 - Regular lanes	1	0 to 300 (seconds)	Enter item time per item parameter 2 (e.g., standard deviation) in seconds for Regular lanes.
Probability of a 100% audit - Fast-Track lanes	0.05	0 to 1.0	Probability of a 100% customer audit (i.e., all items are checked) per transaction for Fast-Track lanes.
Probability of a 30% audit - Fast-Track lanes	0.1	0 to 1.0	Probability of a 30% customer audit (i.e., all items are checked) per transaction for Fast-Track lanes.
Problem item percentage of basket - Fast-Track lanes	0.05	0 to 1.0	Percentage of items in a customer basket that are problem items for Fast-Track lanes.

Problem item time parameter 1 - Fast-Track lanes	10	0 to 300 (seconds)	Problem item time per item parameter 1 (e.g., average time) in seconds for Fast-Track lanes.
Problem item time parameter 2 - Fast-Track lanes	5	0 to 300 (seconds)	Problem item time per item parameter 2 (e.g., standard deviation) in seconds for Fast-Track lanes.
Item registration time parameter 1 - Fast-Track lanes	0.5	0 to 300 (seconds)	Item registration (or Chunter) time per item parameter 1 (e.g., average time) in seconds for Fast-Track lanes.
Item registration time parameter 2 - Fast-Track lanes	0.1	0 to 300 (seconds)	Item registration (or Chunter) time per item parameter 2 (e.g., standard deviation) in seconds for Fast-Track lanes.
Probability of Cash Tender - Fast-Track lanes	0.24	0 to 1.0	Probability of a Cash tender transaction for Fast-Track lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Cheque Tender - Fast-Track lanes	0.47	0 to 1.0	Probability of a Cheque tender transaction for Fast-Track lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Credit Tender - Fast-Track lanes	0.203	0 to 1.0	Probability of a Credit tender transaction for Fast-Track lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Debit Tender - Fast-Track lanes	0.067	0 to 1.0	Probability of a Debit tender transaction for Fast-Track lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Other Tender - Fast-Track lanes	0.02	0 to 1.0	Probability of an Other tender transaction for Fast-Track lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Cash Tender - Express lanes	0.67	0 to 1.0	Probability of a Cash tender transaction for Express lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Cheque Tender - Express lanes	0.213	0 to 1.0	Probability of a Cheque tender transaction for Express lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Credit Tender - Express lanes	0.092	0 to 1.0	Probability of a Credit tender transaction for Express lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Debit Tender - Express lanes	0.025	0 to 1.0	Probability of a Debit tender transaction for Express lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Other Tender - Express lanes	0	0 to 1.0	Probability of an Other tender transaction for Express lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Cash Tender - Regular lanes	0.24	0 to 1.0	Probability of a Cash tender transaction for Regular lanes. Tender probabilities must sum to 1 for each lane type
Probability of Cheque Tender - Regular lanes	0.47	0 to 1.0	Probability of a Cheque tender transaction for Regular lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Credit Tender - Regular lanes	0.203	0 to 1.0	Probability of a Credit tender transaction for Regular lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Debit Tender - Regular lanes	0.067	0 to 1.0	Probability of a Debit tender transaction for Regular lanes. Tender probabilities must sum to 1 for each lane type.
Probability of Other Tender - Regular lanes	0.02	0 to 1.0	Probability of an Other tender transaction for Regular lanes. Tender probabilities must sum to 1 for each lane type.
Cash tender time parameter 1 - Fast-Track lanes	27.7	0 to 300 (seconds)	Cash tender time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Cash tender time parameter 2 - Fast-Track lanes	20	0 to 300 (seconds)	Cash tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Cheque tender time parameter 1- Fast-Track lanes	58.6	0 to 300 (seconds)	Cheque tender time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Cheque tender time parameter 2- Fast-Track lanes	27	0 to 300 (seconds)	Cheque tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Credit tender time parameter 1 - Fast-Track lanes	47.0	0 to 300 (seconds)	Credit tender time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Credit tender time parameter 2 - Fast-Track lanes	26	0 to 300 (seconds)	Credit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Debit tender time parameter 1 - Fast-Track lanes	58.6	0 to 300 (seconds)	Debit tender time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Debit tender time parameter 2 - Fast-Track lanes	24	0 to 300 (seconds)	Debit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Other tender time parameter 1 - Fast-Track lanes	28.7	0 to 300 (seconds)	Other tender time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.

Other tender time parameter 2 - Fast-Track lanes	14	0 to 300 (seconds)	Other tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Cash tender time parameter 1 - Express lanes	22.8	0 to 300 (seconds)	Cash tender time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Cash tender time parameter 2 - Express lanes	11	0 to 300 (seconds)	Cash tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Cheque tender time parameter 1- Express lanes	52.5	0 to 300 (seconds)	Cheque tender time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Cheque tender time parameter 2- Express lanes	26	0 to 300 (seconds)	Cheque tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Credit tender time parameter 1 - Express lanes	42.9	0 to 300 (seconds)	Credit tender time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Credit tender time parameter 2 - Express lanes	21	0 to 300 (seconds)	Credit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Debit tender time parameter 1 - Express lanes	35.4	0 to 300 (seconds)	Debit tender time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Debit tender time parameter 2 - Express lanes	17	0 to 300 (seconds)	Debit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Other tender time parameter 1 - Express lanes	17.1	0 to 300 (seconds)	Other tender time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Other tender time parameter 2 - Express lanes	9	0 to 300 (seconds)	Other tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Cash tender time parameter 1 - Regular lanes	27.7	0 to 300 (seconds)	Cash tender time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Cash tender time parameter 2 - Regular lanes	13	0 to 300 (seconds)	Cash tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Cheque tender time parameter 1- Regular lanes	58.6	0 to 300 (seconds)	Cheque tender time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Cheque tender time parameter 2- Regular lanes	27	0 to 300 (seconds)	Cheque tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Credit tender time parameter 1 - Regular lanes	52.1	0 to 300 (seconds)	Credit tender time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Credit tender time parameter 2 - Regular lanes	26	0 to 300 (seconds)	Credit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Debit tender time parameter 1 - Regular lanes	48	0 to 300 (seconds)	Debit tender time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Debit tender time parameter 2 - Regular lanes	24	0 to 300 (seconds)	Debit tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Other tender time parameter 1 - Regular lanes	28.7	0 to 300 (seconds)	Other tender time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Other tender time parameter 2 - Regular lanes	14	0 to 300 (seconds)	Other tender time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Probability of a Rewards Card event - Fast-Track lanes	0.1	0 to 1.0	Probability of a Rewards Card event that takes place following the tender event for Fast-Track lanes.
Probability of a Rewards Card event - Express lanes	0.1	0 to 1.0	Probability of a Rewards Card event that takes place following the tender event for Express lanes.
Probability of a Rewards Card event - Regular lanes	0.1	0 to 1.0	Probability of a Rewards Card event that takes place following the tender event for Regular lanes.
Rewards Card event time parameter 1 - Fast-Track lanes	20	0 to 300 (seconds)	Rewards Card event time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Rewards Card event time parameter 2 - Fast-Track lanes	10	0 to 300 (seconds)	Rewards Card event time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Rewards Card event time parameter 1 - Express lanes	20	0 to 300 (seconds)	Rewards Card event time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Rewards Card event time parameter 2 - Express lanes	10	0 to 300 (seconds)	Rewards Card event time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.

Rewards Card event time parameter 1 - Regular lanes	20	0 to 300 (seconds)	Rewards Card event time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Rewards Card event time parameter 2 - Regular lanes	10	0 to 300 (seconds)	Rewards Card event time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Probability of intervention event - Fast-Track lanes	0.1	0 to 1.0	Probability of intervention event per transaction for Fast-Track lanes.
Probability of intervention event - Express lanes	0.0	0 to 1.0	Probability of intervention event per transaction for Express lanes.
Probability of intervention event - Regular lanes	0.2	0 to 1.0	Probability of intervention event per transaction for Regular lanes.
Intervention time parameter 1 - Fast-Track lanes	30.0	0 to 300 (seconds)	Intervention time parameter 1 (e.g., average time) per transaction in seconds for Fast-Track lanes.
Intervention time parameter 2 - Fast-Track lanes	15.0	0 to 300 (seconds)	Intervention time parameter 2 (e.g., standard deviation) per transaction in seconds for Fast-Track lanes.
Intervention time parameter 1 - Express lanes	0.0	0 to 300 (seconds)	Intervention time parameter 1 (e.g., average time) per transaction in seconds for Express lanes.
Intervention time parameter 2 - Express lanes	0.0	0 to 300 (seconds)	Intervention time parameter 2 (e.g., standard deviation) per transaction in seconds for Express lanes.
Intervention time parameter 1 - Regular lanes	30.0	0 to 300 (seconds)	Intervention time parameter 1 (e.g., average time) per transaction in seconds for Regular lanes.
Intervention time parameter 2 - Regular lanes	15.0	0 to 300 (seconds)	Intervention time parameter 2 (e.g., standard deviation) per transaction in seconds for Regular lanes.
Do baggers assist at Fast Track lanes?	1	0 (No) or 1 (Yes)	Enter 1 if baggers (or super helpers) assist with bagging at Fast Track lanes or 0 if they do not.
Do baggers assist at Express lanes?	0	0 (No) or 1 (Yes)	Enter 1 if baggers (or super helpers) assist with bagging at Express lanes or 0 if they do not.
Do baggers assist at Regular lanes?	1	0 (No) or 1 (Yes)	Enter 1 if baggers (or super helpers) assist with bagging at Regular lanes or 0 if they do not.
Customer bag rule - Fast-Track lanes	0	0 (No) or 1 (Yes)	Enter 1 if the customer bags at Fast Track lanes or 0 if they do not. Customer bagging task occurs in parallel with other cashier tasks during the transaction.
Customer bag rule - Express lanes	1	0 (No) or 1 (Yes)	Enter 1 if the customer bags at Express lanes or 0 if they do not. Customer bagging task occurs in parallel with other cashier tasks during the transaction.
Customer bag rule - Regular lanes	1	0 (No) or 1 (Yes)	Enter 1 if the customer bags at Regular lanes or 0 if they do not. Customer bagging task occurs in parallel with other cashier tasks during the transaction.
Bagger Bag time per item parameter 1 - Fast-Track lanes	3.0	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 1 (e.g., average time) per item for Fast-Track lanes.
Bagger Bag time per item parameter 2 - Fast-Track lanes	1.5	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 2 (e.g., standard deviation) per item for Fast-Track lanes.
Bagger Bag time per item parameter 1 - Express lanes	3.0	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 1 (e.g., average time) per item for Express lanes.
Bagger Bag time per item parameter 2 - Express lanes	1.5	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 2 (e.g., standard deviation) per item for Express lanes.
Bagger Bag time per item parameter 1 - Regular lanes	3.0	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 1 (e.g., average time) per item for Regular lanes.
Bagger Bag time per item parameter 2 - Regular lanes	1.5	0 to 300 (seconds)	Bagger (super helper or cashier) bag time parameter 2 (e.g., standard deviation) per item for Regular lanes.
Customer Bag time per item parameter 1 - Fast-Track lanes	4.0	0 to 300 (seconds)	Customer bag time parameter 1 (e.g., average time) per item for Fast-Track lanes.
Customer Bag time per item parameter 2 - Fast-Track lanes	2.0	0 to 300 (seconds)	Customer bag time parameter 2 (e.g., standard deviation) per item for Fast-Track lanes.
Customer Bag time per item parameter 1 - Express lanes	4.0	0 to 300 (seconds)	Customer bag time parameter 1 (e.g., average time) per item for Express lanes.
Customer Bag time per item parameter 2 - Express lanes	2.0	0 to 300 (seconds)	Customer bag time parameter 2 (e.g., standard deviation) per item for Express lanes.

Customer Bag time per item parameter 1 - Regular lanes	4.0	0 to 300 (seconds)	Customer bag time parameter 1 (e.g., average time) per item for Regular lanes.
Customer Bag time per item parameter 2 - Regular lanes	2.0	0 to 300 (seconds)	Customer bag time parameter 2 (e.g., standard deviation) per item for Regular lanes.
Probability of Bagger assisting customer to car - Fast-Track lanes	0.5	0 to 1.0	Probability that a bagger assists a customer to their car for Fast-Track lanes.
Probability of Bagger assisting customer to car - Express lanes	0.0	0 to 1.0	Probability that a bagger assists a customer to their car for Express lanes.
Probability of Bagger assisting customer to car - Regular lanes	0.5	0 to 1.0	Probability that a bagger assists a customer to their car for Regular lanes.
Time for Bagger to assist a customer to car parameter 1 - Fast-Track lanes	90.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 1 (e.g., average time) for Fast-Track lanes
Time for Bagger to assist a customer to car parameter 2 - Fast-Track lanes	90.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 2 (e.g., standard deviation) for Fast-Track lanes
Time for Bagger to assist a customer to car parameter 1 - Express lanes	0.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 1 (e.g., average time) for Express lanes
Time for Bagger to assist a customer to car parameter 2 - Express lanes	0.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 2 (e.g., standard deviation) for Express lanes
Time for Bagger to assist a customer to car parameter 1 - Regular lanes	90.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 1 (e.g., average time) for Regular lanes
Time for Bagger to assist a customer to car parameter 2 - Regular lanes	90.0	0 to 300 (seconds)	Time for bagger to assist a customer to their car and return to a lane parameter 2 (e.g., standard deviation) for Regular lanes
Number of simulation replications	30	1 to 100	Number of simulation replications (e.g. Number of days) for the scenario.
Random number stream identifier	1	1 to 10	Random number stream identifier. Different values for this parameter generate a different sequence of random numbers in a simulation scenario.
Write model input parameter to a file?	1	0 (No) or 1 (Yes)	This parameter specifies whether input parameter values are written to the file. A zero indicates no and one indicates yes.

A.3 Front-end Model Default Scenario Schedule Parameters

Time Interval	Baggers	Super Helper	Regular Cashiers	Express Cashiers	Fast-Track Cashiers
12:01 AM -- 12:30 AM	0	0	0	0	0
12:31 AM -- 1:00 AM	0	0	0	0	0
1:01 AM -- 1:30 AM	0	0	0	0	0
1:31 AM -- 2:00 AM	0	0	0	0	0
2:01 AM -- 2:30 AM	0	0	0	0	0
2:31 AM -- 3:00 AM	0	0	0	0	0
3:01 AM -- 3:30 AM	0	0	0	0	0
3:31 AM -- 4:00 AM	0	0	0	0	0
4:01 AM -- 4:30 AM	0	0	0	0	0
4:31 AM -- 5:00 AM	0	0	0	0	0
5:01 AM -- 5:30 AM	0	0	0	0	0
5:31 AM -- 6:00 AM	0	0	0	0	0
6:01 AM -- 6:30 AM	2	4	2	0	1
6:31 AM -- 7:00 AM	2	4	2	0	1
7:01 AM -- 7:30 AM	2	4	3	0	1
7:31 AM -- 8:00 AM	3	4	3	0	1
8:01 AM -- 8:30 AM	4	4	3	1	1
8:31 AM -- 9:00 AM	6	4	3	1	1
9:01 AM -- 9:30 AM	6	4	4	2	1
9:31 AM -- 10:00 AM	6	4	5	2	1
10:01 AM -- 10:30 AM	7	4	6	2	1
10:31 AM -- 11:00 AM	8	4	6	2	1
11:01 AM -- 11:30 AM	8	5	7	2	1
11:31 AM -- 12:00 AM	8	5	7	3	1
12:01 PM -- 12:30 PM	8	5	8	3	1
12:31 PM -- 1:00 PM	10	5	8	3	1
1:01 PM -- 1:30 PM	10	5	7	3	1
1:31 PM -- 2:00 PM	10	5	7	3	1
2:01 PM -- 2:30 PM	12	5	7	3	1
2:31 PM -- 3:00 PM	12	5	8	3	1
3:01 PM -- 3:30 PM	12	5	8	3	1
3:31 PM -- 4:00 PM	12	5	8	3	1
4:01 PM -- 4:30 PM	12	5	8	3	1
4:31 PM -- 5:00 PM	10	5	8	3	1
5:01 PM -- 5:30 PM	10	5	8	3	1
5:31 PM -- 6:00 PM	8	5	7	3	1
6:01 PM -- 6:30 PM	7	5	6	3	1
6:31 PM -- 7:00 PM	6	5	5	2	1
7:01 PM -- 7:30 PM	6	4	5	2	1
7:31 PM -- 8:00 PM	6	4	3	2	1
8:01 PM -- 8:30 PM	6	4	3	2	1
8:31 PM -- 9:00 PM	6	3	3	1	1
9:01 PM -- 9:30 PM	6	2	2	1	1
9:31 PM -- 10:00 PM	6	2	2	1	1
10:01 PM -- 10:30 PM	0	2	2	0	1
10:31 PM -- 11:00 PM	0	2	2	0	1
11:01 PM -- 11:30 PM	0	0	0	0	0
11:31 PM -- 12:00 PM	0	0	0	0	0

A.4 Front-end Model Default Scenario Arrival Rates and Average Basket Sizes

Time Interval	Number of Arrivals	Average Basket Size
12:01 AM -- 12:15 AM	0	0
12:16 AM -- 12:30 AM	0	0
12:31 AM -- 12:45 AM	0	0
12:46 AM -- 1:00 AM	0	0
1:01 AM -- 1:15 AM	0	0
1:16 AM -- 1:30 AM	0	0
1:31 AM -- 1:45 AM	0	0
1:46 AM -- 2:00 AM	0	0
2:01 AM -- 2:15 AM	0	0
2:16 AM -- 2:30 AM	0	0
2:31 AM -- 2:45 AM	0	0
2:46 AM -- 3:00 AM	0	0
3:01 AM -- 3:15 AM	0	0
3:16 AM -- 3:30 AM	0	0
3:31 AM -- 3:45 AM	0	0
3:46 AM -- 4:00 AM	0	0
4:01 AM -- 4:15 AM	0	0
4:16 AM -- 4:30 AM	0	0
4:31 AM -- 4:45 AM	0	0
4:46 AM -- 5:00 AM	0	0
5:01 AM -- 5:15 AM	0	0
5:16 AM -- 5:30 AM	0	0
5:31 AM -- 5:45 AM	0	0
5:46 AM -- 6:00 AM	0	0
6:01 AM -- 6:15 AM	4	15
6:16 AM -- 6:30 AM	12	15
6:31 AM -- 6:45 AM	8	15
6:46 AM - -7:00 AM	20	15
7:01 AM -- 7:15 AM	28	20
7:16 AM -- 7:30 AM	20	20
7:31 AM -- 7:45 AM	24	20
7:46 AM -- 8:00 AM	28	20
8:01 AM -- 8:15 AM	48	25
8:16 AM -- 8:30 AM	40	25
8:31 AM -- 8:45 AM	72	25
8:46 AM -- 9:00 AM	72	25
9:01 AM -- 9:15 AM	124	20
9:16 AM -- 9:30 AM	108	20
9:31 AM -- 9:45 AM	144	20
9:46 AM -- 10:00 AM	140	20
10:01 AM -- 10:15 AM	176	25
10:16 AM -- 10:30 AM	188	25
10:31 AM -- 10:45 AM	164	25
10:46 AM -- 11:00 AM	212	25
11:01 AM -- 11:15 AM	192	20
11:16 AM -- 11:30 AM	212	20
11:31 AM -- 11:45 AM	240	20
11:46 AM - -12:00 PM	216	20
12:01 PM -- 12:15 PM	260	15
12:16 PM -- 12:30 PM	256	15
12:31 PM -- 12:45 PM	300	15

12:46 PM -- 1:00 PM	248	15
1:01 PM -- 1:15 PM	220	20
1:16 PM -- 1:30 PM	220	20
1:31 PM -- 1:45 PM	236	20
1:46 PM -- 2:00 PM	248	20
2:01 PM -- 2:15 PM	272	20
2:16 PM -- 2:30 PM	260	20
2:31 PM -- 2:45 PM	260	20
2:46 PM -- 3:00 PM	300	20
3:01 PM -- 3:15 PM	280	20
3:16 PM -- 3:30 PM	312	20
3:31 PM -- 3:45 PM	276	20
3:46 PM -- 4:00 PM	264	20
4:01 PM -- 4:15 PM	284	30
4:16 PM -- 4:30 PM	280	30
4:31 PM -- 4:45 PM	296	30
4:46 PM -- 5:00 PM	316	30
5:01 PM -- 5:15 PM	332	20
5:16 PM -- 5:30 PM	396	20
5:31 PM -- 5:45 PM	332	20
5:46 PM -- 6:00 PM	296	20
6:01 PM -- 6:15 PM	308	20
6:16 PM -- 6:30 PM	244	20
6:31 PM -- 6:45 PM	252	20
6:46 PM - -7:00 PM	220	20
7:01 PM -- 7:15 PM	176	20
7:16 PM -- 7:30 PM	164	20
7:31 PM -- 7:45 PM	140	20
7:46 PM -- 8:00 PM	164	20
8:01 PM -- 8:15 PM	136	20
8:16 PM -- 8:30 PM	120	20
8:31 PM -- 8:45 PM	80	20
8:46 PM -- 9:00 PM	96	20
9:01 PM -- 9:15 PM	96	20
9:16 PM -- 9:30 PM	76	20
9:31 PM -- 9:45 PM	84	20
9:46 PM -- 10:00 PM	52	20
10:01 PM -- 10:15 PM	52	20
10:16 PM -- 10:30 PM	64	20
10:31 PM -- 10:45 PM	36	20
10:46 PM -- 11:00 PM	40	20
11:01 PM -- 11:15 PM	0	0
11:16 PM -- 11:30 PM	0	0
11:31 PM -- 11:45 PM	0	0
11:46 PM - -12:00 AM	0	0

A P P E N D I X B

Appendix B: Model Output from Default Scenarios for a Lane and Front-end Model

B.1 LaneM2 Results from the Default Scenario

Performance Measure	Average	Std Error	Minimum	Maximum
Scenario run length (minutes)	60.00	0.00	60.00	60.00
Total number of transactions lane 1	21.96	0.45	16.00	29.00
Total number of transactions lane 2	21.08	0.47	13.00	34.00
Total number of transactions both lanes	43.04	0.56	35.00	52.00
Total number of items lane 1	306.72	3.57	262.00	368.00
Total number of items lane 2	312.94	4.24	243.00	381.00
Total number of items both lanes	619.66	5.42	547.00	700.00
Queue size lane 1	0.46	0.01	0.34	0.57
Queue size lane 2	0.44	0.01	0.29	0.60
Queue size both lanes	0.91	0.01	0.75	1.05
Queue time lane 1 (minutes)	1.20	0.02	0.89	1.48
Queue time lane 2 (minutes)	1.20	0.02	0.99	1.47
Average queue time both lanes (minutes)	1.20	0.01	1.01	1.44
Transaction time lane 1 (minutes)	2.69	0.05	2.03	3.73
Transaction time lane 2 (minutes)	2.81	0.06	1.75	4.42
Average transaction time both lanes (minutes)	2.75	0.04	2.34	3.43
Cashier utilisation lane 1	1.00	0.00	1.00	1.00
Cashier itemisation time lane 1 (minutes)	1.42	0.05	0.89	2.15
Cashier tender time lane 1 (minutes)	0.94	0.02	0.63	1.25
Cashier bag time lane 1 (minutes)	0.33	0.01	0.22	0.53
Cashier utilisation lane 2	1.00	0.00	1.00	1.00
Cashier itemisation time lane 2	1.54	0.06	0.68	3.04
Cashier tender time lane 2 (minutes)	0.93	0.02	0.70	1.16
Cashier bag time lane 2 (minutes)	0.34	0.01	0.21	0.43
Number of baggers	0.00	0.00	0.00	0.00
Bagger utilisation	0.00	0.00	0.00	0.00
Average bag time both lanes (minutes)	1.16	0.03	0.75	1.86
Customer unload time lane 1 (minutes)	0.99	0.04	0.54	1.72
Customer bag time lane 1 (minutes)	0.00	0.00	0.00	0.00
Customer idle time lane 1 (minutes)	1.32	0.03	0.97	1.89
Customer unload time lane 2 (minutes)	1.06	0.04	0.40	2.11
Customer bag time lane 2 (minutes)	0.00	0.00	0.00	0.00
Customer idle time lane 2 (minutes)	1.39	0.03	0.80	2.07

B.2 Front-end Model Results from the Default Scenario

Performance Measure	Average	Std Error	Minimum	Maximum
Scenario run length (minutes)	1020	0	1020	1020
Number of customers served	2956.3	9.94	2818	3046
Number of items purchased	62134.4	268.63	59115	65109
Number of Fast-Track transactions	287.97	2.75	254	315
Number of Express transactions	1036.6	5.78	967	1091
Number of Regular transactions	1631.73	5.56	1575	1690
Number of transactions with basket sizes less than or equal to Express limit	1359.13	7.35	1260	1438
Fast-Track basket size	21.13	0.24	18.65	23.5
Express basket size	5.42	0.02	5.15	5.73
Regular basket size	30.91	0.11	29.4	31.76
Number of Fast-Track items checked	746.8	22.65	417	1009
Number of Fast-Track 30% audits	28.23	0.98	18	40
Number of Fast-Track 100% audits	15.03	0.67	8	20
Fast-Track transaction time (minutes)	1.34	0.01	1.25	1.43
Express transaction time (minutes)	0.94	0	0.92	0.98
Regular transaction time (minutes)	2.52	0.01	2.43	2.6
Overall transaction time (minutes)	1.85	0	1.81	1.89
Overall checkout time (minutes) -- time interval from entering to departing a lane	3.01	0.04	2.61	3.67
Overall lane queue time (minutes)	0.99	0.03	0.63	1.64
Overall average queue size at front-end	2.88	0.1	1.82	4.77
Overall maximum queue size at the front-end	30	1.35	18	48
Number of open lanes	8.21	0.01	8.13	8.28
Maximum number of open lanes	14.43	0.16	12	16
Total scheduled Bagger time (minutes)	7110	0	7110	7110
Total scheduled Cashier time (minutes)	8250	0	8250	8250
Total scheduled Super Helpers time (minutes)	4290	0	4290	4290
Number of Overflow lane personnel	5	0	5	5
Number of Baggers scheduled	6.97	0	6.97	6.97
Number of Cashiers scheduled	8.09	0	8.09	8.09
Number of Super Helpers scheduled	4.21	0	4.21	4.21
Total Overflow lane personnel busy time (minutes)	109.31	7.9	25.84	189.62
Total Bagger busy time (minutes)	4564.33	15.99	4417.48	4777.73
Total Cashier busy time -- includes Overflow lane personnel (minutes)	5465.62	21.7	5253.75	5689.77
Total Super Helper busy time (minutes)	649.6	8.62	566.7	759.6
Number of busy Overflow lane personnel	0.11	0.01	0.03	0.19
Number of busy Baggers -- (Baggers only)	4.48	0.02	4.33	4.68
Number of busy Cashiers -- (includes Overflow lane personnel)	8.21	0.01	8.13	8.28
Number of busy Super Helpers	0.47	0.01	0.39	0.53
Customer count that experienced no customers ahead of them at a lane	1784.4	11.18	1669	1958
Customer count that experienced 1 customer ahead of them at a lane	714.23	8.85	620	819
Customer count that experienced 2 customers ahead of them at a lane	277	6.57	204	343
Customer count that experienced 3 customers ahead of them at a lane	105.27	4.35	46	154
Customer count that experienced 4+ customers ahead of them at a lane	75.4	6.31	22	181